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IMPROVED PROTECTIVE COATING FOR SONAR DOMES.(U)
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TECHNICAL MEMORANDUM

U.S. NAVAL APPLIED SCIENCE LABORATORY
NAVAL BASE
BROOKLYN, NEW YORK 11251

IMPROVED PROTECTIVE COATING FOR SONAR DOMES,

Lab. Project 9300-43, Technical Memorandum 4

SS 041-001, Task 8481/2

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N. J. Petito

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MATERIAL SCIENCES DIVISION

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Lab. Project 9300-43
Technical Memorandum 4

Ref: (a) NAVAPLSCIENLAB Program Summary, Task No. 8481/2, Improved Protective Coatings for Sonar Domes, of 1 Dec 1965
(b) Lab. Project 9300-43, Technical Memorandum 3, Improved Protective Coatings for Sonar Domes, of 10 Aug 1965
(c) Lab. Project 9300-43, Technical Memorandum 2, Improved Protective Coatings for Sonar Domes, of 12 May 1965
(d) USNUSL Problem No. 1-650-02-00, Technical Memorandum 933-174-64 of 23 Jun 1964
(e) Visit of Mr. Albert W. Cizek, Jr., USNASL to USNUSL, New London, Conn., on 13 Oct 1965

Table 1 - Test Results on Sonic Erosion of Selected Coating Systems

1. The development of sonar dome coating systems which have good erosion resistance, good anti-fouling properties, and are capable of adhering when exposed to high level pulse fields generated by currently used high power sonar transducers, is continuing at the U.S. Naval Applied Science Laboratory, in accordance with reference (a).

2. This report presents additional information on the NASL polyurethane coating system, designated as coating No. 22F, in references (b) and (c).

3. Extensive screening tests, the results of which have been reported under references (b) and (c), have shown the coating system 22F to be exceptionally promising as an anti-corrosion coating for sonar dome application. The screening tests have included flexibility tests, several 23 hour exposures to the new high sonic pulse facility at NASL, and a 289 hour exposure at the USNUSL sonic facility at Dodge Pond. The new high pulse facility at NASL, consisting basically of an exposure of the coating to the output of a single SQS-26 transducer, will be described in a subsequent progress report.

4. The sonic pulse exposure tests (at NASL and at Dodge Pond) were conducted on a Navy vinyl system (1A) and on a Mare Island Paint Laboratory exterior dome coating system (24A-2), for obtaining a comparison with the NASL coating system (22F). The formulations of these three coatings were as follows:

(a) NASL Coating System (22F)

1 coat Navy formula 117 wash primer
1 coat Navy formula 120 zinc chromate primer
3 coats Dupont RP 5005 Black Sealant

(b) Standard Navy vinyl system (1A)

1 coat Navy formula 117 wash primer
4 coats Navy formula 119 anti-corrosive coating
2 coats Navy formula 121 anti-fouling coating

(c) Mare Island Paint Laboratory exterior dome coating system (24A-2)

1 coat Navy formula 117 wash primer
4 coats Navy formula 119 anti-corrosive coating
1 coat Gaco N100-9 primer
15 coats Gaco N29 coating
2 coats Navy formula 134 anti-fouling coating

5. The results of the tests on the polyurethane coating system No. 22F are tabulated in Table 1, with the results obtained on the standard Navy vinyl system (1A) and the Mare Island Paint Laboratory exterior dome coating system (24A-2). The tabulation includes data obtained on these coating systems evaluated at the USNUSL, Dodge Pond facility, originally reported in reference (d). The results indicated that the polyurethane coating system No. 22F applicable in 5 coats, shows somewhat better resistance to erosion caused by high sonic pulse fields, than the 21 coat Mare Island Paint Laboratory exterior dome coating system (24A-2).

6. On the occasion of reference (e), the performance of the NASL polyurethane coating system 22F was discussed and it was agreed that since no deterioration was noted after 289 hours exposure at Dodge Pond, consideration be given for a shipboard trial as an anti-corrosion coating system. It is considered that the NASL system 22F, by providing corrosion protection, will be an interim solution to the dome coating problem pending development of an anti-fouling component which will be compatible with the 22F system. Until such a component is developed, it is anticipated that the current practice of periodic scrubbing of the dome by scuba divers will be continued.

7. It is further considered that the use of the 5 coat system (22F), which can be applied in approximately 3 days, will considerably reduce the dry docking time for application of protective coatings to sonar domes, when compared to the approximately 7 to 9 days required for application of the 21 coat Mare Island Laboratory exterior dome coating system (24A-2).

8. In view of the results of laboratory and simulated service tests, it is recommended that the Bureau arrange for a service test of the NASL polyurethane

coating system (22F) on a SQS-26 sonar dome, at an early date. The Laboratory would like to be kept informed when such an application is to be made.

9. Work on the program will continue in the development of a suitable tie-coating and anti-fouling coating, for use with the polyurethane 22F anti-corrosive system.

U.S. Naval Applied Science Laboratory

Table 1

TEST RESULTS ON SONIC EROSION OF SELECTED

Coating No.	Coating Description	Test Facility	Total Dry Film Thickness, Mils	Test Period, Hrs.	Eroded Area, Sq. Anti-Fouling Coating Removed	Ba
1A	Standard Navy vinyl system	USNASL	11.0	23	1.970	1
		USNUSL (Dodge Pond)	-	25 to 72	-	
24A-2	Mare Island Paint Laboratory Exterior Dome Coating system	USNASL	28.0	23	0.185	0
		USNUSL (Dodge Pond)	-	426	-	
22F	USNASL polyurethane coating system	USNASL	17.0	23	0.000	0
		USNUSL (Dodge Pond)	-	289	-	

Table 1

ON SONIC EROSION OF SELECTED COATING SYSTEMS

st riod, rs.	Eroded Area, Sq. In. Anti-Fouling Coating Removed	Base Coating Removed	Remarks
3	1.970	1.100	Coating system eroded to bare metal, and heavy checking of formula 121 anti-fouling coating noted in surrounding area.
5 to 72	-	-	Similar deterioration noted on the coating system applied to a 5 ft. x 5 ft. sonar dome test panel, in 25 to 72 hours of exposure at the USNUSL Dodge Pond facility, as reported in reference (d).
3	0.185	0.000	Anti-fouling formula 134 removed in small areas in a checkered pattern down to the neoprene Gaco N29 coating.
26	-	-	Considerable erosion of formula 134 coating was noted on the coating system applied to a 5 ft. x 5 ft. sonar dome test panel, after 426 hours exposure at the USNUSL Dodge Pond facility, as reported in reference (d). It is to be noted, however, that the formula 134 coating did not erode down to the neoprene Gaco N29 coating.
3	0.000	0.000	No deterioration of the coating system noted.
89	-	-	No deterioration of the coating system applied to a 5 ft. x 5 ft. sonar dome test panel was noted after 289 hours exposure at USNUSL Dodge Pond facility. Tests discontinued because of work load at Dodge Pond.